Published in final edited form as:

J Health Soc Behav. 2009 June ; 50(2): 164–179.

Acculturation and Substance Use: Social Influence as a Mediator among Hispanic Alternative High School Youth*

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Abstract

Research suggests that acculturation increases the risk of substance use among Hispanic youth. However, this process is not well understood. This study examined associations between acculturation and several substance use indicators among a sample of 714 Hispanic youth attending alternative high schools in southern California. Peer social influence was assessed as a potential mediator. Acculturation, measured by language use, was associated with increased risk of lifetime alcohol, marijuana, and current alcohol, cigarettes, marijuana, and hard drug use, controlling for age, socioeconomic status, and gender. Results of mediation analyses indicate that peer social influence mediated the relationship between acculturation and lifetime alcohol, and current alcohol, cigarettes, and hard drug use. Evidence for partial mediation was observed with lifetime and current marijuana use. These results provide evidence that peer social influence is an important mediating variable that should be considered when examining the relationship between acculturation and substance use.

Immigrants to a new country are oftentimes influenced by and may incorporate the values, norms, practices, behaviors, language, and customs of the host country. This process, known as acculturation, has the potential to influence individual preferences and attitudes about what constitutes normative behavior (Warner et al. 2006). Hispanic immigrants to the United States are no different. They are exposed to a wealth of new behaviors. Some of these new behaviors may place them at an elevated risk for several adverse health outcomes (Black and Markides 1993; Vega et al. 1998a), gradually shifting their risk behaviors to resemble those of the host country (Unger et al. 2000). Such is the case with substance use. Hispanics living in the United States engage in higher rates of substance and alcohol use than their counterparts living in the country of origin (Caetano and Mora 1988; Cherpitel and Borges 2001; De la Rosa, Khalsa, and Rouse 1990). As a result, Hispanics are disproportionately affected by alcohol-related problems (e.g., cirrhosis of the liver, cirrhosis

*This research was supported by grant 3 P50 DA016094-05S1 from the National Institute on Drug Abuse at the National Institutes of Health.

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mortality, Caetano 2003), HIV/AIDS, and other infectious diseases resulting from substance use (National Institute on Drug Abuse 2004).

In previous years, Hispanic youth have reported substance use rates somewhere between white and black youth. More recently, Hispanic youth have equaled, and in some instances surpassed the substance use rates of whites. Among a nationally representative sample of 12th graders, Hispanics reported the highest rates of crack, heroin (both IV and non-IV), and Rohypnol use (Johnston et al. 2005). In some parts of the United States, crack and ecstasy (MDMA) use was higher among Hispanic youth than among black and white youth (Johnston, O'Malley, and Bachman 2001). Hispanics have also reported some of the highest rates of lifetime alcohol use (Centers for Disease Control and Prevention 2004).

Alternative high schools form a natural demarcation for youth who are at high or low risk for substance use (Sussman et al. 1995c). As youth reach high school age, those who are unable to remain in regular high schools because of several reasons (e.g., poor academic performance, truancy, emotional or functional problems, substance use, and being relatively problem-prone) are transferred to alternative high schools (Simon et al. 1994; Sussman et al. 1995c). These youth “may be at a critical juncture, where they can return to the mainstream or transition into more problematic behaviors, including increased drug use leading to drug abuse” (Sussman et al. 1995c:192). Alternative high school youth are significantly more likely to report illicit drug use than students attending regular high school (Grunbaum and Basen-Engquist 1993; Grunbaum, Lowry, and Kann 2001; Grunbaum et al. 2000), reporting rates three to five times higher (Sussman et al. 1995c). In addition, when these youth use drugs, they are more likely to use more than one type of drug (Beauvais and Oetting 1986).

THEORY AND EVIDENCE

Acculturation and Substance Use

Research on Hispanic substance use has emphasized the importance of acculturation. Defined as the “dual process of cultural and psychological change that takes place as a result of contact between two or more cultural groups and their individual members” (Berry 2005:698), the interchange that occurs when different cultures come into contact with one another can lead to changes in speech, social behavior, attitudes, and customs (Berry 1998; Berry 2005; Unger et al. 2000; Unger et al. 2002). Some have argued that these interpersonal communications are crucial to acculturation, indicating it as one of the most salient forms in the cultural learning process (Hsu, Grant, and Huang 1993; Kim 2005).

Acculturation to United States culture often involves improved English-speaking proficiency. In so doing, youths' interactions with their peers change (Unger et al. 2000). Acculturating youth may be able to communicate with peers they once had been unable to communicate with, potentially accessing a larger or more diverse network of peers that reaches beyond the immigrant peer group (Wall, Power, and Arbona 1993). As a result, youth with greater English-speaking proficiency may come across more pro-substance peer influences, including perceiving substance use (including alcohol and tobacco) as a normative behavior (Rai et al. 2003; Rice, Donohew, and Clayton 2003; Unger et al. 2000; Urberg, Degirmencioglu, and Pilgrim 1997; Windle 2000). Acculturating youth may also

find themselves in circumstances where peers offer or are using illegal substances (Unger et al. 2000).

While the literature has produced some equivocal findings on the association between acculturation and substance use, generally, greater levels of acculturation are associated with greater risk for smoking (Landrine et al. 1994; Unger et al. 2000), alcohol, and substance use (Amaro et al. 1990; De la Rosa 2002; Epstein, Botvin, and Diaz 1998; Epstein, Botvin, and Diaz 2001; Farabee, Wallisch, and Maxwell 1995; Marsiglia and Waller 2002; Nielsen and Ford 2001; Vega, Gil, and Wagner 1998). However, explanations for this relationship have been limited to marginalization and discrimination, acculturative stress, or conflicts that may occur due to adolescents and parents progressing through the acculturation process differently (Alaniz 2002; Felix-Ortiz and Newcomb 1995; Portes and Rumbaut 2001). Others have attributed it to greater availability, access, and acceptability of recreational drug use in the U.S. culture (Escobar 1998), or to a greater susceptibility to peer pressure among more acculturated adolescents (Wall et al. 1993).

To date, three studies have attempted to explain the relationship between acculturation and substance use within the context of peers (Epstein, Doyle, and Botvin 2003; Samaniego and Gonzales 1999; Unger et al. 2000). Using perceived peer norms, negative peer hassles, and peer drinking (respectively), these constructs were used as potential mediators in order to account for the relationship between acculturation and substance use. However, these studies were conducted with a predominantly middle school population. Although some of these studies incorporated other relevant theories, the relationship between acculturation and substance use in this article will be grounded in social learning theory.

According to social learning theory, learning occurs through modeling, which is based on the direct observation and imitation of role models' behavior, or through vicarious learning and reinforcement (Bandura 1977). Substance use behaviors may occur as a result of peers modeling substance use, peers making substances more readily available, peers exerting mutual influence to use substances, and peer norms that encourage substance use (Bandura 1977; Gaughan 2003; Kobus 2003; Oetting and Donnermeyer 1998; Perry and Jessor 1985; Sieving, Perry, and Williams 2000). Peer relationships are considered the primary factor involved in whether youth decide to engage in and maintain substance use (Ennett and Bauman 1993; Ennett and Bauman 2000; Kobus 2003; Valente 2003), with peers reinforcing substance use behaviors (Epstein et al. 1999). This is indicated in part by substance-using youth being more likely to have substance-using friends (Alexander et al. 2001; Bauman et al. 1984; Ennett and Bauman 1993; Ennett and Bauman 1994; Ennett, Bauman, and Koch 1994; Rai et al. 2003; Sieving et al. 2000; Sussman et al. 1990; Unger et al. 2001; Windle 2000). In fact, several studies and reviews of the literature have established that peer influence is a direct and significant predictor of adolescent smoking and substance use (Aseltine 1995; Ennett and Bauman 1993; Hoffman et al. 2006; Jessor and Jessor 1977; Kandel 1978; Kobus 2003; Sieving et al. 2000; Sussman et al. 1995a; Valente, Gallaher, and Mouttapa 2004).

In this study, we examine the association between linguistic acculturation and various life-time and current (past 30-day) substance use outcomes. In incorporating social influence

theory, in particular peer social influence as a potential mediator, we attempt to build on prior research. We hypothesized that (1) there are significant differences in substance use by acculturation level (specifically, English language-preference youth will have higher use rates than Spanish language-preference youth); (2) linguistic acculturation is associated with increased risk for substance use; and (3) the association between language preference and substance use is mediated by peer social influence.

METHODS

Sample and Data Collection

This study is a secondary analysis of baseline data from a substance abuse prevention intervention program conducted in 14 southern California alternative high schools in non-English as a Second Language (ESL) classrooms. The purpose of the intervention was to test whether an evidenced-based substance abuse prevention intervention (“Towards No Drug Use”) can be made more effective by incorporating interactivity and by structuring teams based on social networks. Initially, we contacted 25 school districts in southern California that had alternative high schools within their district. Of these, 17 districts did not participate for various reasons: 10 refused citing administrative concerns; and 7 were not used because the classroom populations were too small or some other restriction was placed on access. Of the remaining eight school districts, one served as a pilot location while the other seven school districts had 14 alternative high schools (for additional information regarding recruitment and survey procedures, please see Valente et al. 2007b). Prior to baseline survey administration, parental consent and student assent were obtained from all participants. The Institutional Review Board at the University of Southern California approved all study procedures (IRB approval number USC-HS-02C016). The sample for this study was restricted to those who completed the baseline survey and those who self-identified as Latino or Hispanic (including Mexican American, Central American, and others), yielding a final sample size of 714. Although participants were not asked about their country of origin, it is likely that many of our respondents are of Mexican origin because almost 78 percent of Hispanics in California are of Mexican descent (U.S. Bureau of the Census 2001). It is also likely that those youth who reported speaking a language other than English speak Spanish. Census data indicate that 65.4 percent of Californians over the age of 4 who speak a language other than English at home speak Spanish (Shin and Bruno 2003). Furthermore, Mexican census data indicate that less than 7 percent of the population speak an indigenous language (INEGI 2006), indicating that Mexican immigrants are more likely to speak Spanish than an indigenous dialect.

Measures

Students completed baseline surveys before the beginning of the intervention. The instrument was a 134-item questionnaire, with items designed to assess various demographic characteristics, multiple substance use indicators, linguistic acculturation, peer social influence, and psychological variables known to be predictive of substance use. The substance abuse prevention intervention from which these data are a subset are described in greater detail elsewhere (Valente et al. 2007a). All the measures described below were included in this study.

Substance use—Measured separately for lifetime and current (past 30 day) use, we asked participants, “How many times have you used each of the drugs below in your [lifetime or past 30 days]?” The drug categories include the following: alcohol; tobacco; marijuana; cocaine or crack; ecstasy; hallucinogens; stimulants or amphetamines; tranquilizers; opiates; inhalants or vapors; and other club/party drugs. Responses were given on an 11-point rating scale ranging from 0 to 91+ times in increasing intervals (e.g., 0 times, 1 to 10 times, 11 to 20 times, 21 to 30 times, etc.). The reliability and predictive validity of this format has been previously established (Sussman et al. 1995a; Sussman et al. 1998). By averaging across responses to cocaine, ecstasy, hallucinogens, stimulants or amphetamines, tranquilizers, opiates, inhalants, and other club/party drugs (gamma-hydroxybutyrate [GHB], ketamine, Rohypnol), a hard drug use index was created ($\alpha = .86$ for lifetime use; $\alpha = .90$ for current use). A higher mean on alcohol, tobacco, marijuana, or hard drug use indicates greater use of those substances

Linguistic acculturation—Four questions were used to assess linguistic acculturation in our sample. They included questions concerning language most often read and spoken; most often spoken at home; most often spoken with friends; and the language respondents preferred for movies, TV, and radio shows. Responses were on a five-point Likert scale with these response categories: only English, English more than another language, English and another language equally, another language more than English, another language only (not English). This scale has been previously shown to have good validity and reliability (Marin et al. 1987). Mean scores ranged from 1 to 5, with lower scores indicating English preference, a marker for higher levels of acculturation ($\alpha = .84$). This variable was reverse-coded whereby a higher mean value indicates greater English proficiency. Although the acculturation process is a complex one, involving multiple dimensions, a major component of acculturation is language use, accounting for a considerable portion of the variance in several acculturation measures (Cuellar, Harris, and Jasso 1980; Epstein et al. 1996; Lessenger 1997). In addition, there is sufficient evidence to suggest that language may play an important role in acculturation and is an efficient proxy for acculturation (Marsiglia and Waller 2002; Norris, Ford, and Bova 1996).

Peer social influence—Three questions were used to assess peer social influence: how many of your five best friends have ever tried drugs, use drugs at least once a month, and would think it is okay for someone to use drugs (Sussman et al. 1995a; Sussman, Dent, and Leu 2000). Response items were given on a four-point scale: none of them, 1 or 2 friends, 3 or 4 friends, or all 5 friends. These items were averaged to create one peer social influence score ($\alpha = .83$).

Covariates—Variables found to be associated with substance-using behaviors were included as covariates, including gender, age, and socioeconomic status. Socioeconomic status (SES) was measured with the question, “What is the highest grade completed by your (father or mother)?” This question was asked separately about fathers and mothers. Response options included: 1 = “not completed elementary school (8th grade)”; 2 = “not completed high school (12th grade)”; 3 = “completed high school (received diploma)”; 4 = “some college or job training (1 to 3 years)”; 5 = “completed college (4 years)”; 6 =

“completed graduate school”; and 7 = “don’t know.” Don’t know was recoded to missing. In order to create one SES score, both of these items were averaged, where a higher score indicates greater education level and SES ($\alpha = .70$).

Data Analysis

Frequencies and chi-square analyses were used to analyze differences among language preference groups. After checking for regression assumptions, the substance use variables (dependent variables) were transformed by their natural log. We conducted mediated associations by employing the method described by Baron and Kenny (1986). Mediation is supported if: (1) linguistic acculturation was significantly associated with substance use; (2) linguistic acculturation was significantly related to the mediator (peer social influence); (3) peer social influence was significantly associated with substance use; and (4) the previously significant direct relationship between linguistic acculturation and substance use became weaker when controlling for peer social influence. We evaluated the mediation pathway with the Sobel test, examining the hypothesis that the indirect pathway from acculturation to substance use through peer social influence is different from zero (Sobel 1982). This last step was conducted using the SAS programming developed by Dudley, Benuzillo, and Carrico (2004), testing the mediation effect and the proportion of the variance attributed to the mediation effect (Beck, Dudley, and Barsevick 2005).

This study used two-level hierarchical linear regressions, where students (level 1) are nested within schools (level 2). This approach allowed us to use individuals as the unit of analysis and to take into account the random-effects resulting from data collected within schools (Singer 1998). One of the unique characteristics of conducting school-based research is that traditional analyses violate critical assumptions of independent observations (Carolan et al. 2007). Even though student assignment to classrooms may occur randomly, over time, students from one school behave more like each other when compared to students in another school (Goldstein 2003). As a result, students become more interdependent, violating the assumption present in most conventional statistical methods (Chou, Spruijt-Metz, and Azen 2004). Ignoring such relationships overlooks the importance of group effects, potentially rendering many of the traditional statistical techniques invalid (Goldstein 2003). Our regression analyses also controlled for age, gender, and SES. A one-tailed $\alpha = .05$ threshold was used to determine the level of significance, and analyses were conducted with the Statistical Analysis System software (SAS Institute 1990).

RESULTS

Demographic Characteristics and Substance Use

Table 1 illustrates the demographic characteristics of the population overall and by language preference. The overall mean age was 16.3 years ($SD = 1.3$), with mean SES of 2.4 ($SD = 1.1$, indicating almost half-way between parents not completing high school and parents completing a high school diploma). The majority of the sample was male (59.2%). When examining differences among the language preference groups, there were small but significant differences in age, with Spanish speakers being slightly older ($M = 16.8$ years [$SD = 1.2$]) than bilingual ($M = 16.4$ years [$SD = 1.3$]) and English speakers ($M = 16.3$ years

[SD = 1.4]; $p < .05$). Also, English speakers were more likely to report parents completing their high school diploma ($M = 2.7$ [SD = 1.1]) than bilingual ($M = 2.2$ [SD = 1.0]) and Spanish speakers ($M = 2.0$ [SD = .6]; $p < .001$). Although there were no significant gender differences among the language preference groups, there were significant differences in lifetime cigarette, marijuana, and hard drug use, and there were also significant differences for current alcohol and marijuana use among the language preference categories, with the differences being greatest between the English and Spanish groups. On average, as English proficiency increased, so did self-reported substance use.

Associations between Substance Use and Language Preference

Table 2 shows the associations between linguistic acculturation and several lifetime and current substance use indicators. The table presents the unstandardized betas of these associations, adjusted for age, SES, gender, and random-effects of schools, but not for peer social influence, the hypothesized mediating variable. For each increase in the level of English language proficiency, the risk for lifetime alcohol use increases by 11 percent ($p < .05$). Significant associations were also observed with lifetime marijuana ($b = .18$; $p < .001$), current alcohol ($b = .08$; $p < .05$), current cigarette ($b = .08$; $p < .05$), current marijuana ($b = .15$; $p < .001$), and current hard drug use ($b = .03$; $p < .05$). Subsequent moderation analyses by gender revealed no significant differences between genders (results not shown).

Table 3 presents the results of the second and third steps of the mediation analyses. Linguistic acculturation was significantly associated with peer social influence. So, with each increase in the level of English language proficiency, the risk for peer social influences to use substances increases by 44 percent ($p = .01$). Age ($b = .34$; $p = .001$) and being female versus male ($b = -.54$; $p = .04$) were also significantly predictive of peer social influence to use substances.

Table 3 depicts the final mediation models, with lifetime and current substance use variables as dependent variables (models were tested separately for each outcome), acculturation as the independent variable, controlling for peer social influence (the mediator), age, SES, gender, and random-effects of schools. Peer social influence was a significant predictor for all of the substance use outcomes, with greater peer influence associated with greater lifetime and current substance use. This table also showed that the significant effects of acculturation observed in Table 2 became weaker and nonsignificant for the outcomes of lifetime alcohol, current alcohol, current cigarette, and current hard drug use, indicating complete mediation. Partial mediation was indicated for the outcomes of lifetime and current marijuana use. According to the criteria set by Baron and Kenny (1986), peer social influence met the conditions for being a mediator for the relationship between acculturation and several substance use outcomes. Results of the Sobel test indicated that the indirect effects were significant, accounting for 25–47 percent of the total mediated effect, depending on the type of substance (dependent variable).

DISCUSSION

Our results indicate that greater English speaking proficiency (linguistic acculturation) is associated with an increased risk of lifetime use of alcohol and marijuana and an increased

risk of current (past 30-day) use of alcohol, cigarettes, marijuana, and hard drugs among a sample of Hispanic youth attending alternative high schools in southern California. Our findings are consistent with those for Hispanic youth attending regular high school (Ebin et al. 2001; Epstein et al. 1998; Epstein et al. 2001; Landrine et al. 1994; Marsiglia et al. 2004; Marsiglia and Waller 2002; McQueen, Getz, and Bray 2003; Unger et al. 2000; Vega, Gil and, Wagner 1998). Possible explanations for these associations, in particular for the association between marijuana and acculturation, have suggested that perhaps it may be related to a perception of marijuana as more permissive in the United States (Tonin et al. 2008). One study indicated that Hispanic youth who reported more permissive attitudes toward drugs in general were at greater risk for marijuana use (Tonin et al. 2008). Coupled with low levels of school commitment, schools with larger percentages of minority students also reported greater marijuana use (Tonin et al. 2008).

In examining peer social influence as a mediator for the association between linguistic acculturation and substance use, acculturation was found to have a strong impact on peer social influence, and peer social influence had a strong impact on all of the substance use outcomes. The significant associations between linguistic acculturation and substance use (lifetime alcohol and current alcohol, cigarette, marijuana, and hard drugs) became nonsignificant when peer social influence was added to the model. This finding suggests that peer social influence may, to some extent, help explain the association observed between acculturation and substance use.

Our results suggest that as Hispanic youth become more proficient in speaking English and acculturate to the American youth culture, they may become more susceptible to peer influence. One explanation for this occurrence may be related to language and culture. Although this study did not specifically examine the acculturation make-up of participants' peer networks, researchers have hypothesized that language barriers and being an immigrant may contribute to a relatively homogeneous make-up of peer networks (Schweizer, Schnegg, and Berzborn 1998). As Burr and Mutchler (2003) point out, language may act as a "vehicle for boundary maintenance, both supporting the unique cultural identity of its members and acting as a barrier to 'out-group' interaction and infiltration" (p. 83). As such, the social networks of Spanish speakers (e.g., recent immigrants) are comprised mostly of others who speak the same language (Burr and Mutchler 2003). Spanish-only speakers may be limited in the number of peers they can communicate with, forming a relatively tight-knit group that interacts with other Spanish speakers. Studies have indicated that unacculturated peers may inadvertently form a closed peer group that may protect against pro-substance use peer influences (Unger et al. 2000). Alternatively, these peer groups may be less inclined to exert pressure on one another to use substances (Wall et al. 1993). Further, non-English speaking, low-acculturated families tend to live in ethnic enclaves and attend ethnic-specific social events and places of worship (Portes 1990), placing their children in contact with other youth with similar cultural backgrounds and beliefs (Unger et al. 2000). Doing so perhaps continues to reinforce strong counter-mandates against substance use seen in ethnic minority groups (Dornelas et al. 2005).

There are also cultural differences with regard to peer-versus-parent orientation (Wall et al. 1993; Wills et al. 2004). For instance, in individualistic societies such as the United States,

adolescence typically involves a separation from parents, relying more on peers for cues as to appropriate norms and behaviors (Harris 1995). Collectivist cultures, on the other hand, may not see this shift because they tend to be more parent-oriented as opposed to peer-oriented. The Hispanic culture tends to be more collectivist (Delgado-Gaitan 1994), with a strong emphasis on family (Marin and Marin 1991; Sabogal et al. 1987), and individuation from parents is not an important aspect of collectivist cultures (Brooks, Stuewig, and LeCroy 1998). Thus, unacculturated Hispanic youth may be more influenced by their parents and less influenced by their peers. Evidence exists to support this hypothesis (Brooks et al. 1998; Triandis 1995; Wall et al. 1993).

Even though our study did not examine this, another possible explanation for our results may be related to social networks and network composition. It is possible that as Hispanic youth acculturate, their social networks may expand, allowing youth to interact with a greater number of peers. These interactions serve as significant sources of information and support for youth (Kobus 2003). Greater interactions may also give acculturating youth greater access to substance-using peers. One study reported that alcohol-using Hispanics were less likely to have friends of the same ethnic group than were non-alcohol users (Kandel and Davis 1991; Krohn et al. 1996; Krohn and Thornberry 1993). These results suggest a manifestation of acculturation whereby greater acculturation, as represented by having more friends of differing ethnic groups, may be related to increased alcohol use (Canino et al. 2003; Krohn and Thornberry 1993).

The structure of the network also has the potential to influence members' behaviors and perceptions. Network-level measures, such as centralization and density, may provide a better understanding of how network ties may directly or indirectly influence substance use behavior (Gest et al. 2007; Valente et al. 2004). For instance, peers' delinquency is strongly associated with an adolescent's delinquency when the friendship network is very cohesive (Haynie 2001). Also, peers in mixed-gender social networks exert varying degrees of influence on one another. For example, males have greater influence over their female friends' drinking patterns, while females do not appear to have any effect on their male friends' alcohol use (Gaughan 2006). Future research could explore these aspects within the structure of immigrant peer networks.

To our knowledge, there are only three other studies examining peer social influence as a potential mediator for the relationship between acculturation and substance use. Despite social influence being measured differently, our findings are consistent with studies conducted with Hispanic youth attending regular schools (Epstein et al. 2003; Samaniego and Gonzales 1999; Unger et al. 2000). One study conducted among a representative sample of California youth attending regular schools reported that best friends' smoking (sometimes used in the literature as social influence) mediated the relationship between linguistic acculturation and smoking among Hispanic youth (Unger et al. 2000). Another study reported that peer drinking mediated the relationship between linguistic acculturation and polydrug use in a sample of Hispanic adolescents (Epstein et al. 2003). Finally, another study reported that negative peer hassles (which included pressure to use drugs) partially mediated the relationship between acculturation (a combination of linguistic acculturation

and generation status) and delinquency (including drug use) in a sample of Mexican American junior high school students (Samaniego and Gonzales 1999).

LIMITATIONS AND IMPLICATIONS

There are several limitations to this research. First, our study only measured one aspect of the acculturation process. Acculturation is a multidimensional process, involving other attitudes and behaviors that were not assessed (Berry 2005). Because of this limitation, the association is more specifically between linguistic acculturation (an important aspect of acculturation) and substance use. Nonetheless, there is sufficient evidence to suggest that language use may be an efficient proxy for acculturation (Epstein et al. 1996; Marsiglia and Waller 2002). Future research is needed where multidimensional acculturation scales are included. Doing so may further our understanding of which acculturation dimensions are associated with adolescent substance use (Unger et al. 2000).

Second, our results are based on youths' self-report of substance use, linguistic acculturation and peer social influence, which may have been biased. However, because our results were confidential, the underreporting bias tends to diminish. In fact, previous research has reported the validity of self-reported substance use data from survey research (Graham et al. 1984; Harrell 1997). In addition, with respect to peer social influence, it should be noted that we measured students' perceptions of how many of their five best friends use substances, and not actual observed peer substance use. It is possible that participants over- or underestimated the number of peers who use substances, especially if they themselves have not observed it, but have been told of peers' substance use. Such has been the case, as noted by other researchers with respect to the weakness of relying on participants' perceptions about their friends' attitudes or behaviors (Wilcox and Udry 1986). Nonetheless, this measure has been reliably used in other studies (Sussman et al. 2000; Sussman et al. 1995b), and some substance use prevention interventions have targeted perceived substance use norms in an attempt to affect actual drug use (Botvin et al. 1994; Botvin et al. 1995; Skara et al. 2005).

Third, these results are cross-sectional, therefore no causality can be inferred. It is possible that peer social influence is a result of substance use (i.e., a desire to use substances may influence choice of peers), as opposed to the cause. Alternatively, acculturation could be the mediator of the association between social influence and substance use. Unacculturated youth looking for acceptance or youth with good social skills or a desire to learn English may deliberately seek out certain types of peers (i.e., more acculturated peers, peers who can help them fit in or help translate the new environment), in turn influencing their own acculturation process. Yet another possible explanation is that, because extended kin tend to live within the same city (84.2% of Hispanics reported kin living on the same block as they did, Schweizer et al. 1998), and because frequent contact with extended family members is high (Hispanics reported 73.3% of their social networks is made up of kin, Bernard et al. 1990), influences to use substances from U.S.-born acculturated familial peers may prevail over the protective effects of low acculturation. Future research is needed to test these alternate hypotheses and to examine the mediation hypothesis prospectively.

Finally, our results may be generalizable only to other Hispanic high risk youth, especially those attending alternative high schools in southern California. Because the majority of

Hispanics in the southern California area are of Mexican descent, these results may not generalize to Hispanics from different countries of origin (e.g., Cuba, Guatemala, Puerto Rico). Nonetheless, these results highlight the importance of substance abuse prevention at the alternative high school level in order to prevent the transition from substance use to substance abuse among this at-risk population.

Despite these limitations, these findings have potential implications for school-based substance use prevention programs. Such programs may be made more effective if they are developed with the acculturation level of the intended audience in mind, noting that as youth acculturate their interactions with their peers may change. These programs also may be made more effective if they consider the impact that peer social influences have on acculturating youth and how these influences may vary depending on the level of acculturation. For example, less-acculturated youth may affiliate more with other youth of similar acculturation level. But substance-using behaviors may begin when less-acculturated youth move toward greater acculturation and affiliate more with other acculturated youth. Although it may not be feasible or cost-effective to tailor programs to unacculturated youth attending large urban schools, whose students are predominantly acculturated, it may be important to consider tailoring substance use intervention programs to acculturating youth, whose risk for peer social influences to use substances may increase with greater levels of acculturation. Future research should also evaluate the effectiveness of substance use prevention programs among Hispanic youth from different countries of origin, and with different levels of acculturation.

These results provide new insight about one possible method accounting for the association between linguistic acculturation and substance use. These results indicate that acculturation has a strong impact on peer social influences, and these peer social influences may encompass pro-substance using norms or peer pressure to use substances. These, then, may have an impact on substance use. This and other factors not measured in this study may explain the association between linguistic acculturation and substance use.

Biography

Raquel Myers is a law student at the University of Utah S.J. Quinney College of Law where she is specializing in health law. Her research has focused on exploring the role of social networks and social influence theory on adolescent substance use. Myers has published under her maiden name, Raquel Fosados, in other areas, including HIV among Mexican migrants, the role of acculturation on adolescent substance use, and ethnic disparities in access to treatment among nonviolent drug offenders.

Chih-Ping Chou is an associate professor in the Department of Preventive Medicine, Keck School of Medicine, University of Southern California, and an Honorary Professor at Sichuan University, West China School of Public Health. His research focuses on computational, methodological, and statistical development in psychometrics, especially structural equation model and multilevel analysis. Chou's research falls into three distinct areas: evaluation of prevention intervention of substance use among adolescents; evaluation

of substance abuse treatment; and statistical and methodological application and development for prevention research.

Steve Sussman is a professor of preventive medicine and psychology at the University of Southern California. Sussman studies etiology, prevention, and cessation within the addictions arena, broadly defined. He has over 320 publications. His projects include Towards No Tobacco Use, Towards No Drug Abuse, and Project EX, which are considered model programs at numerous agencies (i.e., CDC, NIDA, NCI, OJJDP, SAMSHA, CSAP, Colorado and Maryland Blueprints, Health Canada, U.S. Department of Education, and various State Departments of Education). Sussman received the honor of Research Laureate for the American Academy of Health Behavior in 2005, where he also served as President (2007–2008). In 2007, he received the honor of Fellow of the American Psychological Association (Division 50, Addictions).

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Thomas W. Valente is a professor and Director of the Master of Public Health Program in the Department of Preventive Medicine, Keck School of Medicine, University of Southern California. He is author of *Evaluating Health Promotion Programs* (Oxford University Press, 2002); *Network Models of the Diffusion of Innovations* (Hampton Press, 1995); and over 85 articles and chapters on social networks, behavior change, and program evaluation. Valente uses network analysis, health communication, and mathematical models to implement and evaluate health promotion programs designed to prevent tobacco and substance abuse, unintended fertility, and STD/HIV infections. He is also engaged in mapping community coalitions and collaborations to improve health care delivery and

reduce health care disparities. He was recently a visiting scientist at the National Institutes of Health for six months.

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TABLE 1

Selected Sample Characteristics by Language Preference (*N* = 714)

	Overall (<i>N</i> = 714)	English Mostly (<i>N</i> = 415)	Bilingual (<i>N</i> = 246)	Spanish Mostly (<i>N</i> = 53)
Age (Mean, SD) *	16.3 (1.3)	16.3 (1.4) ^a	16.4 (1.3) ^a	16.8 (1.2) ^b
SES (Mean, SD) **	2.4 (1.1)	2.7 (1.1) ^a	2.2 (1.0) ^b	2.0 (0.6) ^b
Gender (<i>N</i> , %)				
Male 404	404 (59.2)	227 (59.3)	144 (58.5)	33 (62.3)
Female 278	278 (40.4)	156 (40.7)	102 (41.5)	20 (37.7)
Substance Use (<i>N</i> , %)				
Lifetime				
Alcohol				
Never	129 (20.8)	64 (19.5)	51 (21.0)	14 (28.6)
1–10 times	159 (25.7)	72 (2.0)	72 (29.6)	15 (30.6)
11–30 times	112 (18.1)	59 (18.0)	44 (18.1)	9 (18.4)
31 or more times	220 (35.5)	133 (40.5)	133 (31.3)	11 (22.4)
Cigarette *				
Never	219 (35.7)	119 (36.7)	79 (32.9)	21 (42.9)
1–10 times	195 (31.8)	90 (27.8)	87 (36.3)	18 (36.7)
11–30 times	77 (12.6)	39 (12.0)	33 (13.7)	5 (10.2)
31 or more times	122 (19.9)	76 (23.5)	41 (17.1)	5 (10.2)
Marijuana **				
Never	206 (33.2)	92 (28.2)	92 (37.9)	22 (44.0)
1–10 times	132 (21.3)	66 (20.2)	49 (20.2)	17 (34.0)
11–30 times	68 (11.0)	34 (10.4)	30 (12.3)	4 (8.0)
31 or more times 214	214 (34.5)	135 (41.3)	72 (29.6)	7 (14.0)
Hard drugs				
Never	324 (53.1)	165 (51.1)	128 (53.8)	31 (63.3)
1–10 times	131 (21.5)	67 (20.7)	53 (22.3)	11 (22.4)
11–30 times	50 (8.2)	31 (9.6)	15 (6.3)	4 (8.2)
31 or more times	105 (17.2)	60 (18.6)	42 (17.6)	3 (6.1)
Current				
Alcohol *				
Never	245 (39.9)	123 (37.7)	99 (41.3)	23 (47.9)
1–10 times	225 (36.6)	120 (36.8)	86 (35.8)	19 (39.5)
11–30 times	86 (14.0)	49 (15.1)	34 (14.2)	3 (6.3)
31 or more times	58 (9.5)	34 (10.4)	21 (8.7)	3 (6.3)
Cigarette				
Never	385 (63.2)	202 (62.4)	146 (61.6)	37 (77.1)
1–10 times	129 (21.2)	62 (19.1)	61 (25.7)	6 (12.5)
11–30 times	40 (6.6)	26 (8.0)	12 (5.1)	2 (4.2)

	Overall (N = 714)	English Mostly (N = 415)	Bilingual (N = 246)	Spanish Mostly (N = 53)
31 or more times	55 (9.0)	34 (10.5)	18 (7.6)	3 (6.2)
Marijuana ^a				
Never	359 (58.7)	174 (53.5)	147 (61.5)	38 (79.2)
1–10 times	117 (19.1)	67 (20.6)	43 (18.0)	7 (14.5)
11–30 times	58 (9.5)	33 (10.2)	24 (10.0)	1 (2.1)
31 or more times	78 (12.7)	51 (15.7)	25 (10.5)	2 (4.2)
Hard drugs				
Never	449 (74.1)	233 (72.1)	172 (73.2)	44 (91.7)
1–10 times	93 (15.3)	54 (16.7)	36 (15.3)	3 (6.2)
11–30 times	29 (4.8)	15 (4.7)	13 (5.5)	1 (2.1)
31 or more times	35 (5.8)	21 (6.5)	14 (6.0)	0 (0.0)

^a Note: or = ANOVA with Duncan grouping was used to test for differences among language preference groups (means with the same letter are not significantly different from one another).

^b ANOVA with Duncan grouping was used to test for differences among language preference groups (means with the same letter are not significantly different from one another).

*
 $p < .05$;

**
 $p < .001$

TABLE 2

Regression Weights of Lifetime and Current Substance Use

Predictors	Lifetime Use				Current Use			
	Alcohol	Cigarettes	Marijuana	Hard Drugs	Alcohol	Cigarettes	Marijuana	Hard Drugs
Age	.05	.01	.07*	.02	.00	.01	.01	-.00
SES	-.03	.03	-.01	.04*	-.03	.02	-.02	.01
Female	-.07	-.01	.01	-.05	-.10	-.02	.07	.00
Acculturation	.11*	.07	.18**	.03	.08*	.08*	.15**	.03*
ICC	.05	.02	.08	.03	.08	.01	.02	.01

Note: Hierarchical modeling adjusts for random-effects of schools.

ICC: Intraclass correlation

*
 $p < .05$

**
 $p < .001$

TABLE 3

Regression Weights on Several Outcomes

	Peer social influence	Lifetime Use				Current Use			
		Alcohol ^a	Cigarettes ^b	Marijuana ^c	Hard Drugs ^d	Alcohol ^e	Cigarettes ^f	Marijuana ^g	Hard Drugs ^h
Predictors									
Age	.34**	.02	-.03	.01	-.00	-.03	-.02	-.02	-.01
SES	-.15	-.01	.06	.02	.05**	-.02	.03	-.00	.02*
Female	-.54*	-.01	.04	.11	-.05	-.06	.02	.12*	.01
Acculturation	.44*	.08	.03	.13**	.01	.05	.03	.10*	.02
Peer social influence	—	.11**	.11**	.17**	.01**	.06**	.08**	.10**	.02**
ICC	.02	.04	.02	.05	.01	.07	.01	.01	.00

Note: Hierarchical modeling adjusts for random-effects of schools

ICC = Intraclass correlation.

* $p < .05$

** $p < .001$

^a Sobel value = 2.66, $p < .01$, total effect mediated = 41%.

^b Sobel value = 2.53, $p < .05$, total effect mediated = 46%.

^c Sobel value = 2.71, $p < .01$, total effect mediated = 36%.

^d Sobel value = 2.56, $p = .01$, total effect mediated = 46%.

^e Sobel value = 2.68, $p < .01$, total effect mediated = 47%.

^f Sobel value = 2.64, $p < .01$, total effect mediated = 40%.

^g Sobel value = 2.73, $p < .01$, total effect mediated = 33%.

^h Sobel value = 2.38, $p < .05$, total effect mediated = 25%.